CLAIMS

We claim:

1. A manufacturing method, comprising:

providing a gate structure over a substrate;

providing a silicon oxide layer over said gate structure and said substrate;

providing a silicon nitride layer over said silicon oxide layer;

providing a first gas flow having a first ratio of fluorine atoms to carbon atoms;

applying a first quantity of power to said first gas flow to form a first plasma and etching a first portion of said silicon nitride layer with said first plasma;

providing a second gas flow having a second ratio of fluorine atoms to carbon atoms greater than said first ratio of fluorine atoms to carbon atoms of said first gas flow; and

applying a second quantity of power to said second gas flow to form a second plasma and etching a second portion of said silicon nitride with said second plasma,

wherein the etching operations result in formation of silicon nitride spacers.

2. The method of Claim 1, wherein said gate structure has a width between about 0.14 μm and about 0.18 μm.

3. The method of Claim 1, wherein said silicon oxide layer has a thickness at least about 20 Å.

4. The method of Claim 1, wherein said first gas flow includes CF_4 and CH_2F_2 at a flowrate ratio of CF_4 to CH_2F_2 between about 9:1 and about 20:1.

5. The method of Claim 1, wherein said first quantity of power is between about 250 W and about 400 W.

6. The method of Claim 1, wherein said etching with said first plasma takes place at a first process pressure between about 10 mTorr and about 20 mTorr.

7. The method of Claim 6, wherein said etching with said second plasma takes place at a second process pressure higher than said first process pressure, said second process pressure being between about 50 mTorr and about 120 mTorr.

8. The method of Claim 1, wherein said second gas flow includes CF_4 and CH_2F_2 at a higher flowrate ratio of CF_4 to CH_2F_2 than said first gas flow.

9. The method of Claim 8, wherein said higher flowrate ratio of CF_4 to CH_2F_2 is between about 15:1 and about 32:1.

10. The method of Claim 1, wherein said second quantity of power is greater than said first quantity of power, said second quantity of power being between about 250 W and about 400 W.

11. A manufacturing method, comprising:

providing a gate structure over a substrate;

providing a silicon oxide layer over said gate structure and said substrate;

providing a silicon nitride layer over said silicon oxide layer;

applying a main etch, comprising:

providing a first gas flow including a first ratio of CF_4 flow rate to CH_2F_2 flow rate; and

applying a first quantity of power to said first gas flow to create a first plasma and etching a first portion

of said silicon nitride layer with said first plasma at a first process pressure; and

applying an overetch, comprising:

providing a second gas flow including a second ratio of CF_4 flow rate to CH_2F_2 flow rate greater than said first ratio of CF_4 flow rate to CH_2F_2 flow rate;

applying a second quantity of power to said second gas flow to create a second plasma, said second quantity of power being greater than said first quantity of power, and

etching a second portion of said silicon nitride layer with said second plasma at a second process pressure greater than said first process pressure,

wherein the etching operations result in formation of silicon nitride spacers.